

# Carbon Nanotubes - A Time Line

**A Word of Caution:** Selecting the key events and publications is a field as hot as that of Carbon Nanotubes in an objective way is an impossible task. The following is a first iteration of my subjective opinion regarding the key events and publications. I apologize if "your" contribution is not quoted - I wanted to keep the list concise.

## 1991 Discovery of multi-wall carbon nanotubes

["Helical microtubules of graphitic carbon", S. Iijima, *Nature* **354**, 56 (1991)]

## 1992 Conductivity of carbon nanotubes

["Are fullerene tubules metallic?", J. W. Mintmire, B. I. Dunlap and C. T. White, *Phys. Rev. Lett.* **68**, 631 (1992)  
"New one-dimensional conductors - graphitic microtubules", N. Hamada, S. Sawada and A. Oshiyama, *Phys. Rev. Lett.* **68**, 1579 (1992)

"Electronic structure of graphene tubules based on  $C_{60}$ ", R. Saito, M. Fujita, G. Dresselhaus and M. S. Dresselhaus, *Phys. Rev. B* **46**, 1804 (1992)]

## 1993 Structural rigidity of carbon nanotubes

["Structural Rigidity and Low Frequency Vibrational Modes of Long Carbon Tubules", G. Overney, W. Zhong, and D. Tománek, *Z. Phys. D* **27**, 93 (1993)]

## 1993 Synthesis of single-wall nanotubes

["Single-shell carbon nanotubes of 1-nm diameter", S. Iijima and T. Ichihashi *Nature*, **363**, 603 (1993)  
"Cobalt-catalysed growth of carbon nanotubes with single-atomic-layer walls", D. S. Bethune, C. H. Kiang, M. S. DeVries, G. Gorman, R. Savoy and R. Beyers, *Nature*, **363**, 605 (1993)]

## 1995 Nanotubes as field emitters

["Unraveling Nanotubes: Field Emission from an Atomic Wire", A.G. Rinzler, J.H. Hafner, P. Nikolaev, L. Lou, S.G. Kim, D. Tománek, P. Nordlander, D.T. Colbert, and R.E. Smalley, *Science* **269**, 1550 (1995).]

## 1996 Ropes of single-wall nanotubes

["Crystalline ropes of metallic carbon nanotubes", Andreas Thess, Roland Lee, Pavel Nikolaev, Hongjie Dai, Pierre Petit, Jerome Robert, Chunhui Xu, Young Hee Lee, Seong Gon Kim, Daniel T. Colbert, Gustavo Scuseria, David Tománek, John E. Fischer, and Richard E. Smalley, *Science* **273**, 483 (1996).]

## 1997 Quantum conductance of carbon nanotubes

["Individual single-wall carbon nanotubes as quantum wires", S.J. Tans, M.H. Devoret, H. Dai, A. Thess, R.E. Smalley, L.J. Geerligs and C. Dekker, *Nature*, **386**, 474 (1997).]

## 1998 Chemical Vapor Deposition synthesis of aligned nanotube films

["Synthesis of large arrays of well-aligned carbon nanotubes on glass", Z.F. Ren et al., *Science*, **282**, 1105 (1998).]

## 1998 Synthesis of nanotube peapods

["Encapsulated  $C_{60}$  in carbon nanotubes", B.W. Smith, M. Monthioux, and D.E. Luzzi, *Nature* **396**, 323 (1998).]

## 1999 Hydrogen storage in nanotubes

["Hydrogen Storage in Single-Walled Carbon Nanotubes at Room Temperature", C. Liu, Y. Y. Fan, M. Liu, H. T. Cong, H. M. Cheng, and M. S. Dresselhaus *Science*, **286**, 1127 (1999).]

## 2000 Nanotubes as Ideal Thermal Conductors

["Unusually High Thermal Conductivity of Carbon Nanotubes", Savas Berber, Young-Kyun Kwon, and David Tománek, *Phys. Rev. Lett.* **84**, 4613 (2000).]

## 2000 Macroscopically aligned nanotubes

["Macroscopic Fibers and Ribbons of Oriented Carbon Nanotubes", Brigitte Vigolo, Alain Pénicaud, Claude Coulon, Cédric Sauder, René Pailler, Catherine Journet, Patrick Bernier, and Philippe Poulin, *Science* **290**, 1331 (2000).]

## 2001 Integration of carbon nanotubes for logic circuits

["Engineering Carbon Nanotubes and Nanotube Circuits Using Electrical Breakdown", P.C. Collins, M.S. Arnold, and P. Avouris, *Science* **292**, 706 (2001).]

## 2001 Intrinsic superconductivity of carbon nanotubes

[M. Kociak, A. Yu. Kasumov, S. Guéron, B. Reulet, I. I. Khodos, Yu. B. Gorbatov, V. T. Volkov, L. Vaccarini, and H. Bouchiat, *Phys. Rev. Lett.* **86**, 2416 (2001).]

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